

1

SYSTEM AND METHOD FOR INTERFACING SIGNALING INFORMATION  
AND VOICE TRAFFIC

TECHNICAL FIELD OF THE INVENTION

The present invention relates in general to telecommunication signal processing and more particularly to a system and method for interfacing signaling information and voice traffic.

5

Conventional telecommunications systems provide signaling information between a Class 5 softswitch and an Internet Protocol network. The Internet Protocol network also receives voice traffic over a physical link from that of the signaling information. The separate physical links require additional interfacing functionality that may slow down the operation of the network. Therefore, it is desirable to avoid additional processing as a result of this problem.

SUMMARY OF THE INVENTION

From the foregoing, it may be appreciated that by those skilled in the art that a need has arisen for a technique to pass signaling and voice traffic through a common element. In accordance with the present invention, a system and method for interfacing signaling information and voice traffic are provided that substantially eliminate or greatly reduce disadvantages and problems associated with conventional telecommunications system operation.

According to an embodiment of the present invention, there is provided a system for interfacing signaling information and voice traffic protocols that includes gateway operable to receive signaling information in a message based signaling format from a Class 5 softswitch. The gateway receives voice signals from a public switched telephone network and places the voice signals into data packets for transfer to an Internet Protocol network with the signaling information. The data packets and the signaling information may be transferred over a common physical link and over separate logical links.

The present invention provides various technical advantages over conventional telecommunications system operation. For example, one technical advantage is to provide signaling information and voice traffic from a common gateway instead of from separate network elements. Another technical advantage is to eliminate the signaling link between the Class 5 softswitch and the Internet Protocol network. Yet another technical advantage is to evolve the public switched telephone network to a packet based broadband distributed network. Other technical advantages may be readily apparent to those skilled in

● TENT APPLICATION

the art from the following figures, description, and claims.

項目	1990年	1991年	1992年	1993年	1994年	1995年	1996年	1997年	1998年	1999年	2000年	2001年	2002年	2003年	2004年	2005年	2006年	2007年	2008年	2009年	2010年	2011年	2012年	2013年	2014年	2015年	2016年	2017年	2018年	2019年	2020年	2021年	2022年	2023年	2024年	2025年	2026年	2027年	2028年	2029年	2030年	2031年	2032年	2033年	2034年	2035年	2036年	2037年	2038年	2039年	2040年	2041年	2042年	2043年	2044年	2045年	2046年	2047年	2048年	2049年	2050年	2051年	2052年	2053年	2054年	2055年	2056年	2057年	2058年	2059年	2060年	2061年	2062年	2063年	2064年	2065年	2066年	2067年	2068年	2069年	2070年	2071年	2072年	2073年	2074年	2075年	2076年	2077年	2078年	2079年	2080年	2081年	2082年	2083年	2084年	2085年	2086年	2087年	2088年	2089年	2090年	2091年	2092年	2093年	2094年	2095年	2096年	2097年	2098年	2099年	2100年																																																								
1. 人口	120,000,000	125,000,000	130,000,000	135,000,000	140,000,000	145,000,000	150,000,000	155,000,000	160,000,000	165,000,000	170,000,000	175,000,000	180,000,000	185,000,000	190,000,000	195,000,000	200,000,000	205,000,000	210,000,000	215,000,000	220,000,000	225,000,000	230,000,000	235,000,000	240,000,000	245,000,000	250,000,000	255,000,000	260,000,000	265,000,000	270,000,000	275,000,000	280,000,000	285,000,000	290,000,000	295,000,000	300,000,000	305,000,000	310,000,000	315,000,000	320,000,000	325,000,000	330,000,000	335,000,000	340,000,000	345,000,000	350,000,000	355,000,000	360,000,000	365,000,000	370,000,000	375,000,000	380,000,000	385,000,000	390,000,000	395,000,000	400,000,000	405,000,000	410,000,000	415,000,000	420,000,000	425,000,000	430,000,000	435,000,000	440,000,000	445,000,000	450,000,000	455,000,000	460,000,000	465,000,000	470,000,000	475,000,000	480,000,000	485,000,000	490,000,000	495,000,000	500,000,000	505,000,000	510,000,000	515,000,000	520,000,000	525,000,000	530,000,000	535,000,000	540,000,000	545,000,000	550,000,000	555,000,000	560,000,000	565,000,000	570,000,000	575,000,000	580,000,000	585,000,000	590,000,000	595,000,000	600,000,000	605,000,000	610,000,000	615,000,000	620,000,000	625,000,000	630,000,000	635,000,000	640,000,000	645,000,000	650,000,000	655,000,000	660,000,000	665,000,000	670,000,000	675,000,000	680,000,000	685,000,000	690,000,000	695,000,000	700,000,000	705,000,000	710,000,000	715,000,000	720,000,000	725,000,000	730,000,000	735,000,000	740,000,000	745,000,000	750,000,000	755,000,000	760,000,000	765,000,000	770,000,000	775,000,000	780,000,000	785,000,000	790,000,000	795,000,000	800,000,000	805,000,000	810,000,000	815,000,000	820,000,000	825,000,000	830,000,000	835,000,000	840,000,000	845,000,000	850,000,000	855,000,000	860,000,000	865,000,000	870,000,000	875,000,000	880,000,000	885,000,000	890,000,000	895,000,000	900,000,000	905,000,000	910,000,000	915,000,000	920,000,000	925,000,000	930,000,000	935,000,000	940,000,000	945,000,000	950,000,

5

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings, wherein like reference numerals represent like parts, in which:

FIGURE 1 illustrates a block diagram of a telecommunications network implementing a signaling interface technique;

FIGURE 2 illustrates a block diagram of a telecommunications network implementing a concentrator technique;

FIGURE 3 illustrates a block diagram of a telecommunications network with both the signaling interface and concentrator techniques.

6

DETAILED DESCRIPTION OF THE INVENTION

FIGURE 1 shows a block diagram of a telecommunications network 10 implementing a signaling interface technique. Telecommunications network 10 includes a public switched telephone network (PSTN) 12 and a broadband loop emulation service (BLES) network 14. Conventionally, PSTN 12 couples to BLES network 14 through a Class 5 switch 16 and a gateway 18 in order to provide communications to and from an integrated access device (IAD) 20 at a customer premises 22. Signaling information having one of various broadband loop emulation service signaling protocols, including a channel associated signaling format and a BLES common channel signaling format, is received at gateway 18 from Class 5 switch 16 for transfer to BLES network 14. Channel associated signaling is used to determine such information as ringing, off-hook, and on-hook for a normal plain old telephone service (POTS) telephone. Gateway 18 transfers pulse code modulated voice signals and the signaling information preferably over BLES network 14 using asynchronous transfer mode cells to an appropriate IAD 20.

According to the present invention, a signaling network 24 provides signaling information in a network signaling format to a Class 5 softswitch 26. The Class 5 softswitch 26 converts the network signaling format to a media gateway and call session control format. Class 5 softswitch 26 provides the call control, feature activation control, and call accounting intelligence for telecommunications network 10. In the broadband loop emulation services proxy network architecture of telecommunications network 10, Class 5 softswitch 26 is responsible for and has the authority to accept and

7

control both incoming call requests from the network as well as outgoing call requests from customer premises 22. Class 5 softswitch 26 utilizes network signaling to and from the network and the media gateway and call session control format to and from gateway 18 to establish and teardown subscriber calls and invoke call features on existing calls. Gateway 18 receives the media gateway and call session control format from Class 5 softswitch 26 for processing in order to provide signaling information to the BLES network 14. Examples of media gateway and call session control protocols include Signaling Gateway Control Protocol (SGCP), Media Gateway Control Protocol (MGCP), H.248, H.323, and Signaling Interface Protocol (SIP) signaling standards.

In operation, Class 5 softswitch 26 receives signaling information in a network signaling format from signaling network 24. Signaling network 24 is shown using an SS7 network signaling format example but may be configured to use any of a variety of signaling protocols to include international signaling configurations such as the C7 signaling protocol and other signaling protocols such as SIP, SIP-T, BICC, and Sigtran. Class 5 softswitch converts the signaling information received in the network signaling format from signaling network 24 to a media gateway and call session control format. The media gateway and call session control format may be any of a variety of such formats including those specified above. The media gateway and call session control format is provided to gateway 18 for conversion to the desired broadband loop emulation service signaling protocol and passed on to IAD 20 at customer premises 22 through BLES network 14.

In order for gateway 18 to support and perform the BLES proxy signaling function, gateway 18 includes additional capabilities over and above those needed for conventional BLES operation. These capabilities include dial tone generation, hook flash detection, frequency shift keying tone detection for caller identification generation, tone detection, digit collection, and call progress tones including re-order tones, busy tones, and fast busy tones. Class 5 softswitch 26, through the signaling information, instructs gateway 18 as to which of the capabilities gateway 18 is to perform.

For reverse operation, signaling information in the broadband loop emulation service signaling format is provided to gateway 18 by IAD 20 at customer premises 22 through BLES network 14. Gateway 18 converts the broadband loop emulation service signaling format to a media gateway and call session control format. Gateway 18 provides signaling information in the media gateway and call session control format to Class 5 softswitch 26. Class 5 softswitch converts the media gateway and call session control format to a network signaling format. Signaling information in the network signaling format is provided for transfer within signaling network 24 by Class 5 softswitch 26. The present invention may accommodate any type of signaling information as alluded to above.

FIGURE 2 shows a block diagram of telecommunications 20 implementing a concentrator technique separate and distinct from the signaling interface of FIGURE 1. Telecommunications network 20 includes PSTN 12, signaling network 24, Class 5 softswitch 26, and gateway 18. Telecommunications network 20 also includes an Internet Protocol (IP) network 30 coupled to various IADs 20 at a



plurality of customer premises 22. Gateway 18 receives pulse code modulated voice signals carried over inter-machine trunks from PSTN 12. Gateway 18 converts the voice signals to Realtime Transport Protocol (RTP) packets for transmission to appropriate IADs 20 over IP network 30. The IADs 20 receive the RTP packets and convert the information carried therein back to voice signals. Gateway 18 receives signaling information in the media gateway and call session control format from Class 5 softswitch 26. The signaling information assist gateway 18 by identifying which trunk provides the voice signals, which IAD 20 to communicate with, and to connect PSTN 12 to IP network 30. Class 5 softswitch 26 also provides signaling information to IADs 20 over IP network 30 to control individual telecommunications equipment coupled to IADs 20 at customer premises 22.

To eliminate a need for a signaling information link from Class 5 softswitch 26 to IADs 20, the signaling information for controlling individual pieces of telecommunications equipment coupled to IADs 20 may be processed through gateway 18. Gateway 18 provides management of signaling information between Class 5 softswitch 26 and IADs 20. Gateway 18 performs translation of the signaling information between Class 5 softswitch 26 and IADs 20. Gateway 18 will provide both the voice encoded RTP packets and the signaling information in the media gateway and call session control format to IADs 20. This technique eliminates the requirement of coupling Class 5 softswitch 26 to IP network 30. Class 5 softswitch 26 no longer needs to keep track of all IADs 20 being communicated with as this function is now off loaded to extended routing capabilities in gateway 18. The RTP packets and the

signaling information are provided on separate logical paths from gateway 18 to IADs 20 and may or may not be provided on the same physical link therebetween. Thus, gateway 18 provides concentration of signaling information with voice encoded packets to destination IADs 20.

Gateway 18 also handles communications from IADs 20 to PSTN 12 and Class 5 softswitch 26. Gateway 18 may receive voice encoded RTP packets and signaling information in the media gateway and call session control format from IADs 20. Gateway 18 converts the RTP packets into voice signals for transfer to PSTN 12 over the inter-machine trunks. Gateway 18 also processes the signaling information for transfer to Class 5 softswitch 26 and ultimately to signaling network 24.

FIGURE 3 shows a block diagram of a telecommunications network 30 incorporating both the signaling interface and concentrator techniques. Gateway 18 can also provide conversion of the broadband loop emulation service signaling protocol to the media gateway and call session control format for transfer of signaling information from Class 5 switch 16 or BLES network 14 to IP network 30. Gateway 18 may also provide the conversion of signaling information from Class 5 switch 16 or BLES network 14 for transfer to Class 5 softswitch 26. Gateway 18 further provides the concentration function discussed above.

The signaling interface and concentrator features provided by gateway 18 discussed above enable service providers to deploy a softswitch architecture together with standards based voice over digital subscriber lines (VoDSL) without requiring the change out of multiple generations of IADs 20. In the first stages of VoDSL

deployment, the installed base of VoDSL IADs 20 primarily support asynchronous transfer mode (ATM) based broadband loop emulation services. In order to deploy VoDSL in a next generation softswitch architecture, IADs 20 must be able to support voice over internet protocol (VoIP), MGCP, h.248/Megaco, SIP, among other new telephone features. This would force service providers to do a complete change out of customer premises hardware, resulting in increased costs and disruption of services. Gateway 18 allows service providers to migrate their existing network to next generation packet technologies. Gateway 18 is able to offer service providers the flexibility to deploy VoDSL in a Class 5 derived architecture, a pure softswitch architecture, or a hybrid architecture regardless of the network topology or standards based protocol enabled in IAD 20.

In summary, gateway 18 offers for example integrated northbound and southbound MGCP, H.248/Megaco, and SIP in combination with the BLES proxy feature that is able to take for example AAL2 BLES from IAD 20 and translate it to MGCP, H.248, and SIP to enable a seamless interface with a softswitch architecture. Along with the concentrator feature, the BLES proxy feature allows service providers to deploy standards based VoDSL immediately without forcing a major upgrade of customer premises equipment to migrate the network for supporting a Class 5 replacement or advanced services provided by a softswitch. The present invention makes different types of customer premises equipment appear uniform to the switching core, enabling service providers to de-couple the core network switching evolution from the access equipment.

Thus, it is apparent that there has been provided,  
in accordance with the present invention, a system and  
method for interfacing between signaling protocols that  
satisfies the advantages set forth above. Although the  
5 present invention has been described in detail, it should  
be understood that various changes, substitutions, and  
alterations may be readily ascertainable by those skilled  
in the art and may be made herein without departing from  
the spirit and scope of the present invention as defined  
10 by the following claims.

066303.0170